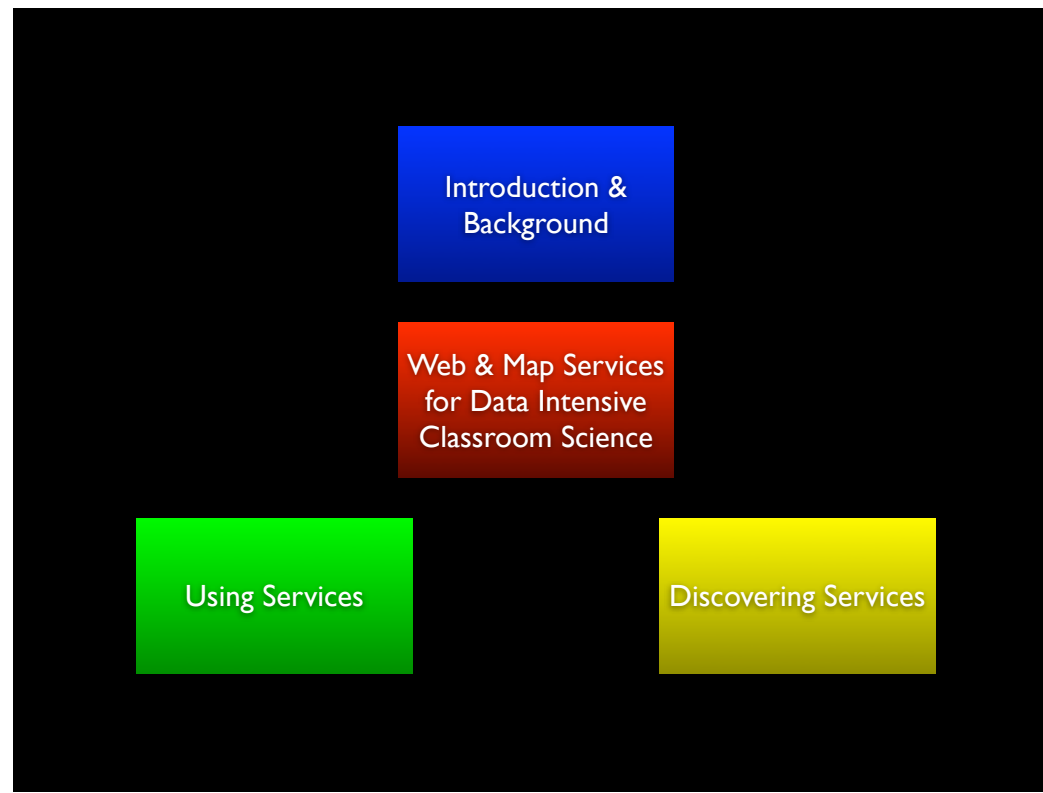


# Finding and using map and data services for data intensive science teaching

Karl Benedict  
Director, Earth Data Analysis Center, UNM

Tuesday, July 12, 2011



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What are some key map and web service standards?

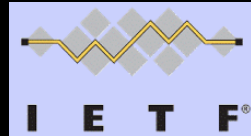
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## What are some key map and web service standards?



Web Map Service

WMS



Hypertext Transfer  
Protocol

HTTP



Representational  
State Transfer

REST

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## What Are Map and Web Services?

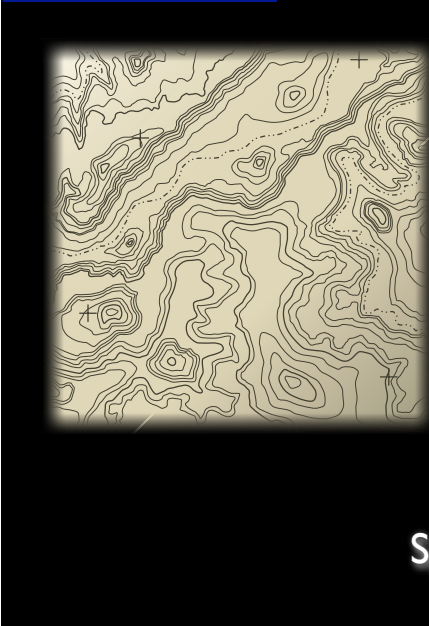
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# What Are Map and Web Services?



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## What Are Map and Web Services?



# JPEG PNG GIF TIFF

Models  
Charts  
preadsheets  
Text Files

# JPEG PNG GIF TIFF

Models  
Charts  
preadsheets  
Text Files

[illegible]

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How are map and web services accessed?

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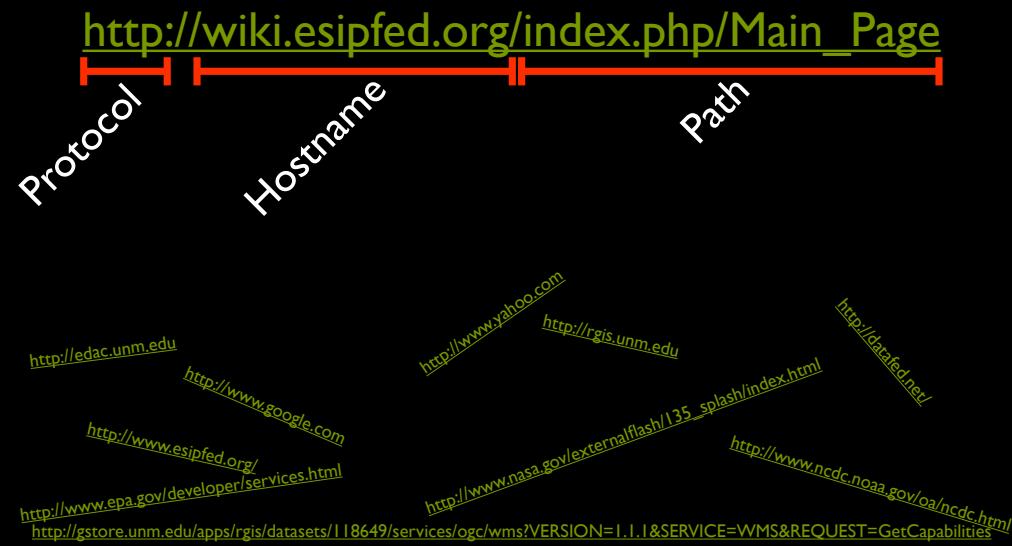
# How are map and web services accessed?

HyperText  
Transfer  
Protocol

HTTP  
HTTPS

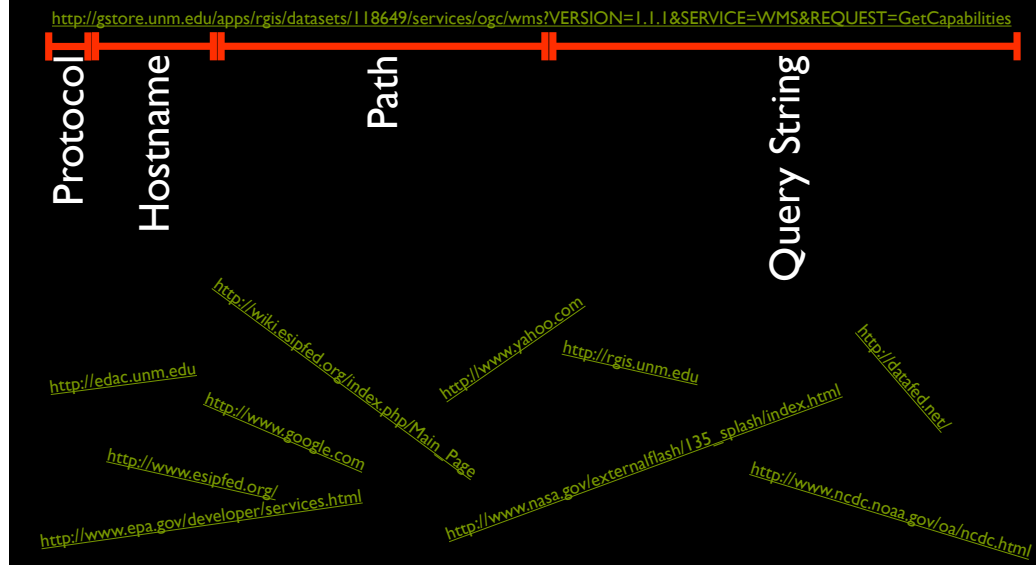
<http://edac.unm.edu>  
[http://wiki.esipfed.org/index.php/Main\\_Page](http://wiki.esipfed.org/index.php/Main_Page)  
<http://www.yahoo.com>  
<http://rgis.unm.edu>  
<http://data6d.net/>  
<http://www.google.com>  
<http://www.esipfed.org/>  
[http://www.nasa.gov/externalflash/135\\_splash/index.html](http://www.nasa.gov/externalflash/135_splash/index.html)  
<http://www.epa.gov/developer/services.html>  
<http://www.ncdc.noaa.gov/oa/ncdc.html>  
<http://gstore.unm.edu/apps/rgis/datasets/118649/services/ogc/wms?VERSION=1.1.1&SERVICE=WMS&REQUEST=GetCapabilities>

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## How are map and web services accessed?



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Introduction &  
Background

Web & Map Services  
for Data Intensive  
Classroom Science

Using Services

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## Interacting with Web Map Services (WMS)

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### Core Requests\*

- *GetCapabilities* - Request for information about the WMS - delivered in XML
- *GetMap* - Request for a map image representing the underlying data for the requested layers

\* there are others ... For the complete documentation go to <http://www.opengeospatial.org/standards/wms>

Photo Credit: <http://www.flickr.com/photos/jakeliefer/240926153/>

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## Demonstration - Sample *GetCapabilities* Requests

[http://neowms.sci.gsfc.nasa.gov/wms/wms?  
version=1.1.1&service=WMS&request=GetCapabilities](http://neowms.sci.gsfc.nasa.gov/wms/wms?version=1.1.1&service=WMS&request=GetCapabilities)

[http://frameworkwfs.usgs.gov/framework/wms/wms.cgi?  
SERVICE=WMS&REQUEST=GetCapabilities](http://frameworkwfs.usgs.gov/framework/wms/wms.cgi?SERVICE=WMS&REQUEST=GetCapabilities)

[http://gstore.unm.edu/apps/rgis/datasets/107428/services/ogc/wms?  
VERSION=1.1.1&SERVICE=WMS&REQUEST=GetCapabilities](http://gstore.unm.edu/apps/rgis/datasets/107428/services/ogc/wms?VERSION=1.1.1&SERVICE=WMS&REQUEST=GetCapabilities)

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Demonstration - Sample *GetMap* Requests

<http://neowms.sci.gsfc.nasa.gov/wms/wms?VERSION=1.1.1&REQUEST=GetMap&SRS=EPSG:4326&WIDTH=512&HEIGHT=512&LAYERS=BlueMarbleNG-TB&TRANSPARENT=TRUE&FORMAT=image/png&BBOX=-115.0583687946505,29.61990852118474,-97.30601968859783,39.38563175627022>

[http://frameworkwfs.usgs.gov/framework/wms/wms.cgi?VERSION=1.1.1&REQUEST=GetMap&SRS=EPSG:4326&WIDTH=512&HEIGHT=512&LAYERS=COUNTY\\_OR\\_EQUIVAL:Framework&STYLES=County+Styles&TRANSPARENT=True&FORMAT=image/png&BBOX=-115.0583687946505,29.61990852118474,-97.30601968859783,39.38563175627022](http://frameworkwfs.usgs.gov/framework/wms/wms.cgi?VERSION=1.1.1&REQUEST=GetMap&SRS=EPSG:4326&WIDTH=512&HEIGHT=512&LAYERS=COUNTY_OR_EQUIVAL:Framework&STYLES=County+Styles&TRANSPARENT=True&FORMAT=image/png&BBOX=-115.0583687946505,29.61990852118474,-97.30601968859783,39.38563175627022)

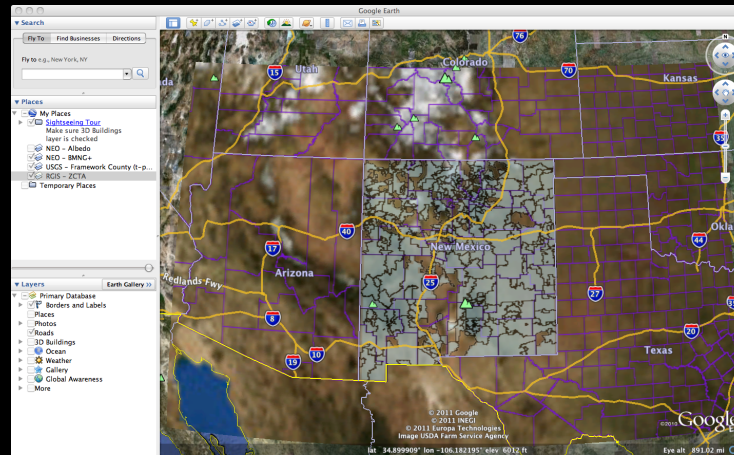
[http://gstore.unm.edu/apps/rgis/datasets/107428/services/ogc/wms?VERSION=1.1.1&REQUEST=GetMap&SRS=EPSG:4326&WIDTH=512&HEIGHT=512&LAYERS=t1\\_2010\\_35\\_zcta510&TRANSPARENT=TRUE&FORMAT=image/png&BBOX=-115.0583687946505,29.61990852118474,-97.30601968859783,39.38563175627022](http://gstore.unm.edu/apps/rgis/datasets/107428/services/ogc/wms?VERSION=1.1.1&REQUEST=GetMap&SRS=EPSG:4326&WIDTH=512&HEIGHT=512&LAYERS=t1_2010_35_zcta510&TRANSPARENT=TRUE&FORMAT=image/png&BBOX=-115.0583687946505,29.61990852118474,-97.30601968859783,39.38563175627022)

Fun Exercise - Calculating BBOX and Image Width/Height to maintain consistent aspect ratio for map images

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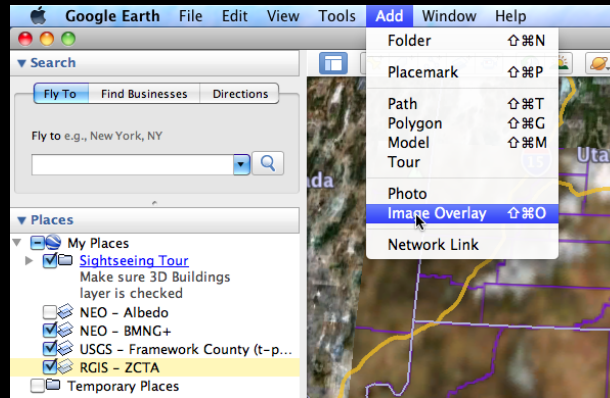


## Demonstration - Google Earth



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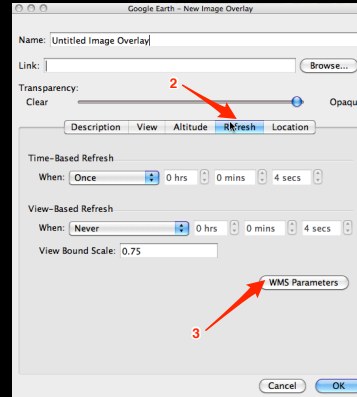
## Demonstration - Google Earth



I. Select “Image Overlay” from the “Add Menu”

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## Demonstration - Google Earth

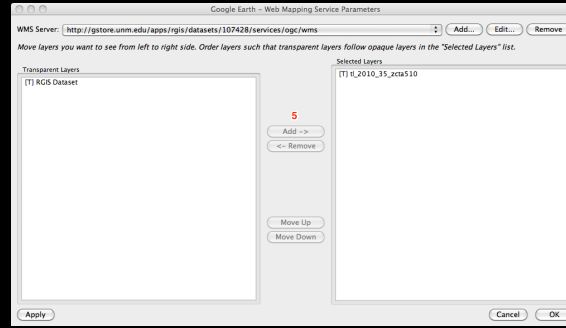


2. Select the “Refresh” button
3. Select the WMS Parameters button

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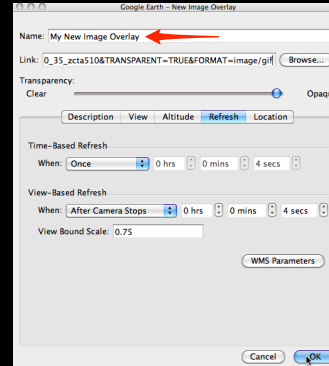
## Demonstration - Google Earth



5. Add one or more layers from the left side of the dialog to the list of “selected” layers on the right-hand side, and click the “ok” button.

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## Demonstration - Google Earth



6. Give the newly created image overlay a meaningful name, and click the “ok” button.

Optional - modify “link” field to modify WMS parameters

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## Interacting with REST Web Services for accessing data

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REST Web Services are standardized in their interaction model, BUT the specifics will vary from service to service.

The samples demonstrated here are based upon one set of services hosted by the New Mexico Resource Geographic System

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## Interacting with REST Web Services for accessing data

### Demonstration of RESTful\* data services from NM RGIS <http://rgis.unm.edu>

#### **Census Data**

KML/KMZ File: <http://rgis.unm.edu/gstore/datasets/107428.kmz>

CSV File: <http://rgis.unm.edu/gstore/datasets/107428.csv>

XLS File: <http://rgis.unm.edu/gstore/datasets/107428.xls>

Metadata (HTML): <http://rgis.unm.edu/gstore/datasets/107428/metadata/107428.html>

#### **Hydrologic Units**

KML/KMZ File: <http://rgis.unm.edu/gstore/datasets/52209.kmz>

CSV File: <http://rgis.unm.edu/gstore/datasets/52209.csv>

XLS File: <http://rgis.unm.edu/gstore/datasets/52209.xls>

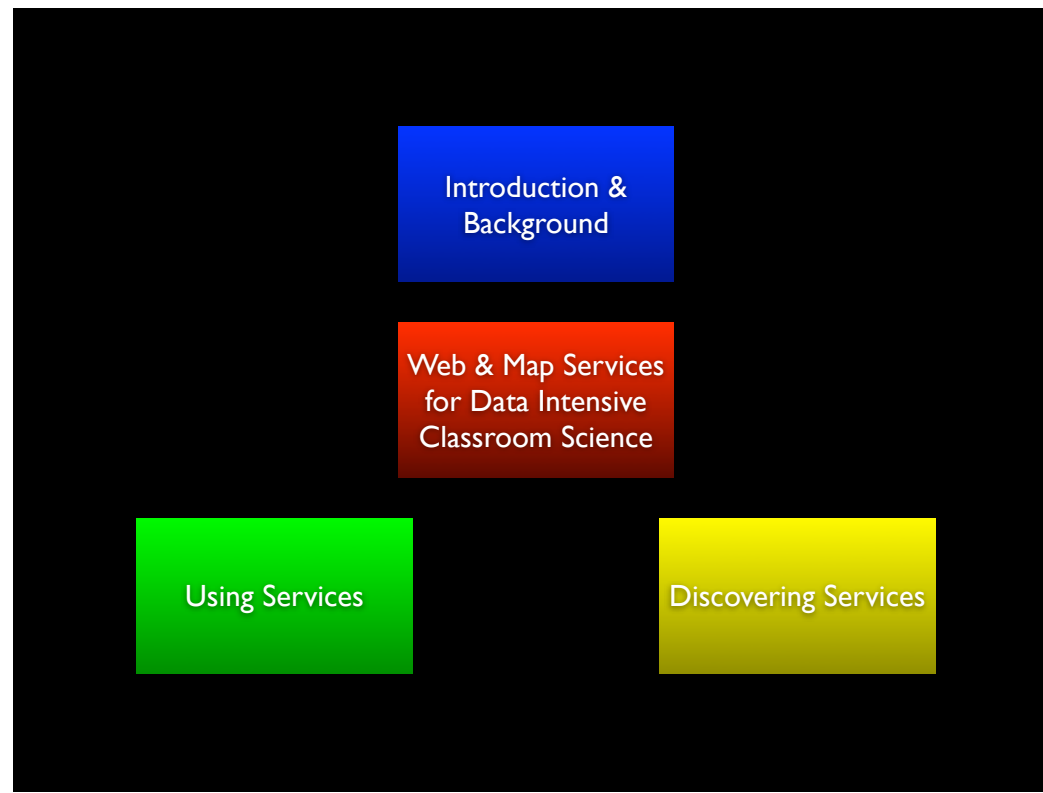
Metadata (HTML): <http://rgis.unm.edu/gstore/datasets/52209/metadata/52209.html>

All Features (KML): <http://129.24.63.99:9999/apps/rgis/datasets/52209/features.kml> (experimental)

Subset of Features (KML): [http://129.24.63.99:9999/apps/epscor/features.kml?dataset\\_ids=106451&filters=prec>=4.1,elevation>=3200](http://129.24.63.99:9999/apps/epscor/features.kml?dataset_ids=106451&filters=prec>=4.1,elevation>=3200) (experimental)

\* REST API documentation available at: <http://gstore.unm.edu>

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## Service Catalogs

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Group on Earth Observations - Registry System

<http://geossregistries.info/holdings.htm>

Geospatial One Stop

<http://gos2.geodata.gov/wps/portal/gos>

Global Change Master Directory

<http://gcmd.nasa.gov/>

NM Resource Geographic Information System

<http://rgis.unm.edu>

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Discovering Services

Google Search

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"service=WMS" "request=getcapabilities"

epa web services

nasa web services

noaa web services

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# Conclusions

There are an increasing number of online resources that make Earth science and other data products available in useful formats

These resources are increasingly based upon a general web services model that provides *flexible information access*

If you can compose a web URL, you can interact with these services

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## Abbreviations and Resources

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OGC - Open Geospatial Consortium (<http://www.opengeospatial.org>)  
REST - Representational State Transfer ([http://en.wikipedia.org/wiki/Representational\\_State\\_Transfer](http://en.wikipedia.org/wiki/Representational_State_Transfer))  
WMS - Web Map Service (<http://www.opengeospatial.org/standards/wms>)  
XML - Extensible Markup Language (<http://www.w3.org/XML/>)

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